

**Not For Production Use (For Reference Only)**

**ASTM A270-03 S2 / ASME BPE and UI**

Welded Austenitic Stainless Steel Pharmaceutical Tubing

**ASTM Chemical Requirements**

Elements	304	304L	316	316L
	S30400	S30403	S31600	S31603
(C) Carbon, max	0.080	0.035	0.080	0.035
(Mn) Manganese, max	2.000	2.000	2.000	2.000
(P) Phosphorus, max	0.045	0.045	0.045	0.045
(S) Sulfur Range	0.030	0.030	0.005 -0.017	0.005 -0.017
(Si) Silicon	1.000	1.000	1.000	1.000
(Ni) Nickel	8.0-11.0	8.0-12.0	10.0-14.0	10.0-14.0
(Cr) Chromium	18.0-20.0	18.0-20.0	16.0-18.0	16.0-18.0
(Mo) Molybdenum	N/A	N/A	2.0-3.0	2.0-3.0
(Ti) Titanium	N/A	N/A	N/A	N/A

Surface Finish in accordance with ASME B46.1

No. 80 - ground with 80 grit.

No. 120 - ground with 120 grit.

No. 180 - ground with 180 grit.

UI I.D. spec is 20 Ra for mechanically polished.

R - Rouge polished free of grinding marks, pits, and other surface imperfections.

Mirror-like quality.

T - Electro-polished free of grinding marks, pits, visible non-metallic inclusions, or other surface imperfections.

UI I.D. electropolish specification is 10 Ra or 15 Ra.

**Mechanical Testing Test**

Test	ASTM	United
Flare	Not Required	Required
Flatten	Not Required	Required
Flange	Not Required	Required
Reverse Bend	Not Required	Required
Reverse Flatten	Required	Required
Eddy Current	Required*	Required
Hydrostatic	Required*	Not Required
Hardness, max	N/A	95 Rb
Pressure	Not Required	Required *

**Laboratory Testing**

Test	ASTM	United
Passivation test per MIL-STD 753B	Not Required	Required
Electro-polish visual	Not Required	Required

**Heat Treatment**

-Heat treat by heating to 1900 F minimum and then quenching.

**Stencil**

-Man. Name or brand, spec number, and grade, marked "welded", and the surface finish.

\*Air pressure test 30 psi tubes over 20' for HBA / 180 grit / ID Polish tubes

\* ASTM required either an Eddy Current or a Hydrostatic test be performed.

**Dimensional Requirements**

Size	Outside Diameter		Squareness		Length**		Straightness		Weld Height		Wall***	
	ASTM S2.3/BPE	United	ASTM	United	ASTM	United	ASTM	United	ASTM	United	ASTM S2.3/BPE	United
1/2"	-.005/+0.005	-.005/+0.005	N/A	.015	-0 / +2"	-0 / +1/8"	.030/36"	.015/36"	.004	+.004	+/- 10.0%	+/- 10.0%
3/4"	-.005/+0.005	-.005/+0.002	N/A	.015	-0 / +2"	-0 / +1/8"	.030/36"	.015/36"	.004	+.004	+/- 10.0%	+/- 10.0%
1"	-.005/+0.005	-.005/+0.002	N/A	.017	-0 / +2"	-0 / +1/8"	.030/36"	.015/36"	.006	+.006	+/- 10.0%	+/- 10.0%
1-1/2"	-.008/+0.008	-.006/+0.002	N/A	.026	-0 / +2"	-0 / +1/8"	.030/36"	.015/36"	.006	+.006	+/- 10.0%	+/- 10.0%
2"	-.008/+0.008	-.006/+0.002	N/A	.035	-0 / +2"	-0 / +1/8"	.030/36"	.015/36"	.006	+.006	+/- 10.0%	+/- 10.0%
2-1/2"	-.010/+0.010	-.008/+0.002	N/A	.044	-0 / +2"	-0 / +1/8"	.030/36"	.015/36"	.010	+.010	+/- 10.0%	+/- 10.0%
3"	-.010/+0.010	-.008/+0.003	N/A	.052	-0 / +2"	-0 / +1/8"	.030/36"	.015/36"	.010	+.010	+/- 10.0%	+/- 10.0%
4"	-.015/+0.015	-.008/+0.003	N/A	.070	-0 / +2"	-0 / +1/8"	.030/36"	.015/36"	.010	+.010	+/- 10.0%	+/- 10.0%
6"	-.030/+0.030	-.030/+0.030	N/A	.070	-0 / +2"	-0 / +1/8"	.030/36"	.015/36"	.010	+.010	+/- 10.0%	+/- 10.0%

\*\* Applies only to 0.049" wall and over. For less than 0.049", the O.D. tolerance shall be agreed upon by the manufacturer and purchaser.